

**IN THE UNITED STATES  
PATENT AND TRADEMARK OFFICE**

**TITLE:**

Ski Protected Against Wearing and Mechanical Damages

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[0001] This patent application claims priority under 35 USC §119 upon (1) Slovenian utility application, No. P-200200221, having a filing date of September 12, 2002; and (2) Slovenian utility application, No. P-200300171, having a filing date of July 8, 2003.

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## **FIELD OF THE INVENTION**

[0002] The invention relates to the field of skis, especially to creation of the top surface of the ski as well as of the ski edges. In particular, the invention is directed to manufacturing of rental skis, which are exposed to wear and mechanical damage due to  
10 extensive use.

## **BACKGROUND OF THE INVENTION**

[0003] Various agencies in numerous worldwide ski centers deal with rental of the skis. Tourists arriving from various destinations often do not transport their own skis. Rental  
15 skis are repeatedly exposed to wear and damage, especially in the area of the top edges, i.e. transitions from the top surface into both side surfaces of the ski, especially on the rearward portion, the so-called tail, and also on the forward portion between the tip and the ski binding. Such damage occurs, whenever the top edge of a ski comes in contact with the sharp and hard ski edge of another ski, e.g. by crossing-over the skis. In certain  
20 cases, the top surface of the ski may also be damaged by ski cross-overs.

[0004] There are several reasons why rental skis are exposed to intensive wear and damage. On the one hand, many users paying for rental skis do not take sufficient care to appropriately use the skis. At the same time, many users are not very skilled in skiing, and often cross-over their skis. As mentioned above, the use of such rental skis may be much more intensive than the use of private skis. On the other hand, each user, who has to pay money for rental of the skis, expects the skis to be without significant wear or damage. When taking these circumstances into account, the manufacturers of rental skis are exposed to high expectations with respect to ensuring appropriate resistance of the skis, in some cases granting warranty for the skis for at least two skiing seasons.

10 [0005] It is therefore the purpose of the present invention to increase resistance of the ski against wear and damage in the area of the top edges adjacent to the top surface, and also on the top surface, especially on the forward portion of the ski between the ski binding and the tip, as well as on the rearward portion, the so-called tail, by which the safety of a skier may not be jeopardized, and the visual appearance of the ski should not be essentially changed.

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[0006] Known skis have a sliding layer with the ski edges on its bottom side. Above the sliding layer is a core, which is covered by side covering layers and with a metallic bearing layer on its upper side, which may also be covered with a decorative layer. In such skis, top edges of the metallic layer are relatively resistant against wear and mechanical damage, except against damage caused by contact with a ski edge of another ski. It should be stated, that a ski edge is manufactured of high-quality steel, which is

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thermally or otherwise treated in order to maintain the shape and sharpness as long as possible during the use of the ski. On the contrary, the metallic layer of the ski consists of a desired alloy, which enables increased elasticity and simultaneously maintaining the weight as low as possible.

5 [0007] As a consequence of numerous deficiencies related to skis with a metallic layer, another type of ski is used, which also comprises a sliding layer with the ski edges on its bottom surface, while the core above the sliding layer is coated with the top covering layer, which extends over the top surface and also over the side surfaces of the ski downwards to the said ski edges. Such ski enables achieving essentially higher torsion  
10 and bending stiffness and has better resistance against outside influences. The top covering layer consists of light materials having relatively low hardness, in particular of plastics, so that the resistance of such ski against wear and mechanical damage in the area of top edges, i.e. transitions between the top surface and the side surfaces, is relatively low. Being aware of benefits resulting from such a concept on the one hand, as well as of  
15 the problems related to wearing the ski on the other hand, manufacturers have tried to eliminate wear and damage in the area of the top edges by surmounting protectors on the top surface of a completely manufactured ski in the area of top edges, as described, e.g. in a pending Slovenian patent application No. P-200100171. These protectors, e.g. ledges, are mounted onto a ski by means of attaching screws. However, as a result of appropriate  
20 testing it has been found, that such approach, although the ledges actually protect the ski from damages, may lead to some undesired effects related either to undesired visual

appearance of the ski or undesired removing of the protectors or parts thereof after certain time of intensive use of the ski.

[0008] Furthermore, several known skis which, in addition to the ski edges lying in the plane of the sliding surface, comprise additional ski edges or similar guide strips, which  
5 are arranged on certain vertical displacement with respect to the previously mentioned edges.

[0009] One of such skis is described in EP 0 087 089, and is the central portion i.e. in the area of attaching the ski binding and the ski shoe equipped with additional edges on its both sides, where the purpose of these edges is activation of the corresponding additional  
10 edge whenever the regular ski edge e.g. on the iced ground would slide, by which an uncontrolled sliding the ski would occur.

[0010] Still further ski is described in EP 0530 395 A1, wherein addition of regular ski edges adjacent to the sliding surface are also additional ski edges, which are arranged on each side of the ski and protrude sidely above the normal ski edges, so that between the  
15 corresponding pair of a normal edge and additional edge there is a groove, which extends in the longitudinal direction of the ski. In order to ensure a desired functionality of these additional edges, each additional edge must be sharp like every regular ski edge. Such a sharp edge, which protrudes sidely from the ski, may jeopardize the safety of the user, and moreover also the other ski with respect to possibility of causing damages on the  
20 unprotected top surface including the top edges thereof.

[0011] Still another ski is described in EP 0 723 791, by which at least on one side of the ski above the normal ski edge an additional ski edge is foreseen, which consists of equal or similar material like the normal ski edge and extends up to certain height on the side surface of the ski in the area of attaching the ski shoe or the ski binding. The purpose of adding such additional ski edge is increasing the elasticity of the ski, so that the additional ski edge is arranged exclusively in the area of the highest bending stresses and therefore quite outside of the area, where the wearing and damages occur.

[0012] In addition, EP 622 097 A1 relates to a ski having a specific cross-section, which is changing along the ski. In addition to the edges lying adjacent to the sliding layer, such ski is equipped with two additional ski edges, each of them extending along the belonging side of the ski over the central portion of the ski, where the ski binding is available, namely forwards nearly up to the curved transition into the tip and rearwards practically over the complete tail. In the area of the said curved transition into the tip only the normal ski edges are present, the cross-section of which is L-shaped, the longer arm of which is placed within the ski and the shorter arm extends downwards along the side surface of the ski adjacent to the sliding surface towards the ground. The cross-section of the ski in this area is rectangular and essentially flat. The cross-section of the forward portion of the ski between the transition into the tip and the central portion is step-like shaped, so that the bottom area of the ski is narrower than the upper area. A similar ski is described in US Re 29,659, and a snowboard using a similar concept was disclosed in US 5,871,224. Side surfaces of the widened upper area of the ski are formed by shorter,

downwards extending arms of L-shaped guide strips, while the longer arms of these guide strips are placed adjacent to the ski edges. In the central portion of the ski, i.e. in the area of mounting a ski binding and attaching the ski shoe, the cross-section of the ski is practically trapezoidal, so that the width of the running surface is essentially smaller than the width of the top surface of the ski. The guide strips are still L-shaped, by which the horizontally one towards another directed arms are placed below the top surface of the ski, while the shorter arms of triangular cross-section extend vertically upwards and comprise horizontally outwards protruding edges. The purpose of the guide strips is to ensure guiding the ski despite to sliding the ski edges e.g. on the iced ground. Due to arrangement of the guide strips within the area of transition from the top surface of the ski into the side surfaces, except in the area of the tip, it seems, that the problem of resistance against wear is herewith avoided. In fact, this is not true. The guide strips may seriously jeopardize the safety of the user, since in the rearward portion and also in the forward portion of the ski the sharp edges on the guide strips like in EP 0 622 097 A1 protrude sidely from the side surfaces of the skis. In addition, it is also obvious that such kind of ski cannot be manufactured in accordance with modern concept of manufacturing the skis, namely with a sliding layer with the ski edges, over which a core is placed and also with a top layer, which extends over the complete top surface and also over the side surfaces. This also means, that achieving the physical features as required by each modern competitive ski, i.e. bending and torsion stiffness, is very difficult.

## **SUMMARY OF THE INVENTION**

[0013] Accordingly, the present invention relates to a ski, which is resistant against wear and mechanical damage and comprising a sliding layer with longitudinal ski edges on its bottom surface faced towards the ground, while above the sliding layer there is a core, and above this core there is a top covering layer extending over the top surface and if desired over the side surfaces of the ski, so that transitions like top edges are available between the top surface and the side surfaces.

[0014] According to the invention, at least in the area of exposure to wear or mechanical damage on the top surface of the ski and the top edges, i.e. at least on the forward portion between the tip and the ski binding area, as well as on the rearward portion, below the top covering layer in the area of each corresponding top edge or at least in its adjacency, at least one reinforcing profile is provided, which extends in the longitudinal direction of the ski along the top edge or at least in the adjacency thereof, and is resistant against wear and mechanical damage resulting from coming into contact with the ski edges of another ski. By this, the outward surface of each reinforcing profile, which may be available in the form of an ordinary ski edge, is either inclined or even rounded, and the covering layer is interrupted in the area of the top edges of the ski. In one embodiment, the reinforcing profile is a U-profile, which comprises parallel flanges and a web, the outward surface of which is rounded at least on the upper side thereof. Furthermore, it may be seen that the covering layer may be furnished with one reinforcing profile in the



area of each of its longitudinal edges by means of inserting thereof between the flanges of each corresponding reinforcing profile. Each reinforcing profile may also be inserted by means of its flange into a recess, which is located between each corresponding side covering layer extending along the side surface of the ski, and the covering layer, while  
5 the top flange thereof is placed above the covering layer. Furthermore, it may be seen that the covering layer of the ski is arranged below the highest surface of the reinforcing profiles, and preferably, the covering layer is concave in the area of the top surface of the ski.

## **BRIEF DESCRIPTION OF THE DRAWINGS**

Now the invention will be described on the basis of several embodiments, which are shown in the enclosed drawings, where

5 Fig. 1 is a perspective view of the first embodiment of a ski according to the invention, namely a cross-section thereof in the area exposed to wearing or mechanical damages, before inclining or rounding top edges;

Fig. 2 is detail A according to Fig. 1;

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Fig. 3 is a perspective view of a ski with inclined top edges, in cross-section in the exposed area as in Fig. 1;

Fig. 4 is detail B according to Fig. 3;

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Fig. 5 is a perspective view of a further embodiment of a ski according to the invention, namely a cross-section thereof in the area exposed to wear or mechanical damage;

Fig. 6 is a detail C according to Fig. 1;

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Fig. 7 is a perspective view of a still further embodiment of a ski according to the invention, namely a cross-section thereof in the area exposed to wear or mechanical damage, during manufacturing prior to furnishing thereof with reinforcing profiles; and

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Fig. 8 is a detail D according to Fig. 7.

## **DETAILED DESCRIPTION OF THE INVENTION**

[0015] A ski according to the invention is provided with a sliding layer 1, along which extends appropriate ski edges 2', 2" which are arranged on the bottom surface facing  
5 towards the ground. Above layer 1 there is a core 3, which comprises in this particular embodiment a supplemental layer 3', which is arranged between the ski edges 2', 2". A covering layer 4 is placed over the core 3, extending thereby over the top surface 5 as well as over the side surfaces 6', 6" of the ski. Between the top surface 5 and both side surfaces 6', 6" of the ski, there are transitions, i.e. the so-called top edges 7', 7".

10 [0016] According to the invention, at least one reinforcing profile 8', 8" is incorporated within the area of each corresponding top edge 7', 7" below the covering layer 4, by which the profile 8', 8" extends in the longitudinal direction of the ski and is resistant with respect to wear and mechanical damage resulting from establishing contact with the ski edge 2', 2" of another ski.

15 [0017] By one of possible embodiments of the invention, which is illustrated in Figs. 1 to 4, the reinforcing profile 8', 8" is shown in form of ordinary profile for manufacturing ski edges 2', 2", where the outward surfaces 80', 80" are inclined or even rounded, and at the same time the covering layer 4 is interrupted in the area of the said top edges 7', 7".

[0018] A further embodiment of a ski, according to Figs. 5 to 8, includes reinforcing  
20 profiles 8', 8" in form of U-profiles, which consists of parallel flanges 82, 83 as well as of

a web 81, which is at least on its top portion adjacent to the flange 82 equipped with appropriate rounded outward surface 80', 80" of the reinforcing profile 8', 8". The bottom flange 83 of each reinforcing profile 8', 8" is inserted into appropriate recess 91', 91", which is available between each side covering 9', 9" of the ski and the covering layer 4, and which extends below the covering layer 4 along each side surface 6', 6" in the longitudinal direction of the ski. Each of the recesses 91', 91" can be simply and precisely manufactured by means of temporary inserting appropriate belts 90', 90" between the side covering layers 9', 9" and the covering layer 4 adjacent to the supplemental layer 3", however only during assembling and mutual connecting of constituent parts, namely of the sliding layer 1 with the ski edges 2', 2", the core 3 with the supplemental layer 3' between the said ski edges 2', 2" and in this particular embodiment also the supplemental layer 3" below the covering layer 4, the side covering layers 9', 9" and the said covering layer 4. The belts 90', 90" comprise appropriate non-binding material, which are difficult to bind to the constituent parts of the ski due to increased pressure and temperature. When e.g. the side covering layers 9', 9" consist of a plastic material like e.g. ABS, the belts 90', 90" may comprise unprocessed polyethylene or Teflon. As soon as the said constituent parts of the ski are assembled and connected each to other, the belts 90', 90" are removed, whereupon the recesses 91', 91 remain available between each of the side covering layers 9', 9" and the covering layer 4. The bottom web 83 of each reinforcing profile 8', 8" equipped by appropriate adhesive coating, if desired, is then pressed into the said recess 91', 91" onto both side surfaces 6', 6" of the ski.

[0019] Another embodiment of a ski is illustrated in Fig. 5. In this embodiment, the covering layer 4 is furnished with the reinforcing profiles 8', 8" before assembling the ski, where each longitudinal edge 40', 40" thereof is inserted into the belonging reinforcing profile 8', 8", namely between its flanges 82, 83. In this particular embodiment is the covering layer 4 furnished with the reinforcing profiles 8', 8" and after that assembled and connected with other constituent parts of the ski, namely with the core 3, side covering layers 9', 9" and any other parts, by which the presence of the belts 90', 90" is unnecessary.

[0020] On the other hand it is also possible, and may be even preferable in certain circumstances, that in the area of the top surface 5 of the ski the covering layer 4 is sank below the reinforcing profiles 8', 8", and is especially concave. In such manner even by providing rounded or inclined outward surfaces 80', 80" of the reinforcing profiles 8', 8", any possibility of establishing contact between the top surface 5 of the ski and the ski edges 2', 2" of another ski is eliminated.

[0021] Accordingly, the ski, which consists of a sliding layer 1 with ski edges 2', 2", arranged on the bottom side, as well as of the core 3, above which a covering layer 4 is placed, extends over the top surface 5 and also over the side surfaces 6', 6", is improved with respect to resistance against wear and mechanical damage in a simple and efficient manner. Essentially increasing the resistance against wear and mechanical damage is achieved by means of incorporation of reinforcing profiles 8', 8" within the top edges 7', 7" adjacent to the top surface 5 of the ski or even on the said surface 5, especially in the

most exposed areas on the forward portion of the ski between the tip and the ski binding, as well as on the tail of the ski. When taking into account that the outward surface 80', 80" of each reinforcing profile 8', 8" is inclined or even round, the safety of the user cannot be jeopardized at all.